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Cosmics muon validation and electronics performance of the New Small Wheel MicroMegas sectors for ATLAS Muon Upgrade

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The ATLAS Muon Upgrade project is a part of the Large Hadron Collider (LHC) - High Luminosity (HL) upgrade project which aims to increase its instantaneous luminosity up to 7.5X10^{34} $cm^{-2}s^{-1}$. The present first muon station in the forward regions of ATLAS is being replace by the so-called New Small Wheels (NSWs). The NSWs consist of resistive-strip MicroMegas (MM) detectors and small-strip Thin Gap chambers (sTGC), both providing trigger and tracking capabilities, for a total active surface of more than 2500 m^2. After the R&D, design and prototyping phase, series production of MM and sTGC chambers are being constructed. The NSW Upgrade project, the most challenging and complex one of the ATLAS phase-I upgrade projects, is expected to be completed with the installation of NSW in the ATLAS Underground cavern during the summer of 2021. The whole NSW structure includes 128 detectors, in total to ~2.4 million readout channels. This new generation of readout electronics are built to stand the harsh radiation hostile conditions, where the expected background rate will reach 20 kHz/cm^2. Eight micromegas detectors layers are integrated into a double wedge. The mechanical integration is followed by the electronic integration and its initial validation into the data acquisition system. Each fully equipped MicroMegas doublewedge is tested at a dedicated cosmic ray facility and the high voltage settings are defined. Then, a sequence of tests follows, related to efficiency maesurement , cluster size, resolution for all the individual layers of the double wedge are performed. These steps consist the qualification of the MicroMegas sector for the final integration with the sTGC wedges before mounting them on the NSW structure. The electronics performance and cosmic rays validation results of the final validation
of Micromegas double wedges will be presented.

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